OFFICE OF THE INDEPENDENT BUDGET ANALYST REPORT

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Proposed Water Allocation Methodology

OVERVIEW

On November 10, 2008 the City Council adopted revisions to the City's emergency water regulations, defining certain water use behavioral restrictions that would be imposed under various drought response levels. In addition, the emergency water regulations provide for the establishment of water allocations when drought conditions require demand reduction of greater than 10% (Drought Response Levels 2 – 4). On March 20, 2009, the Water Department released a proposed methodology for establishing water allocations. Under this proposal, each water customer would receive an allocation that is based on a percentage of historical use. The proposed methodology was presented at the March 25 meeting of the Natural Resources & Culture Committee.

The proposed methodology was originally developed in anticipation that a 20% reduction in water use would be necessary beginning July 1, 2009. However, more recent information about actions expected to be taken by the Metropolitan Water District of Southern California suggest that required reductions may be less than originally projected. As a result, the Director of Public Utilities, in a memo dated April 10, recommended that the City move to a Level 2 – Drought Alert condition, which would impose certain mandatory behavior restrictions. If approved, these behavior restrictions would be implemented in lieu of water allocations.

This report presents additional information and analysis of the water allocation methodology as proposed on March 20. As indicated in the April 10 memo, the Water Department will continue to refine the proposed methodology based on a number of questions and concerns, with the intent of presenting it to Council for adoption in the near future.

FISCAL/POLICY DISCUSSION

Water agencies across the country employ a wide range of drought management strategies to reduce water consumption. These strategies have ranged from incentive programs for installing water efficient hardware such as shower heads and toilets, to prohibition of watering lawns and landscaping. Virtually all drought management plans begin with a call for voluntary conservation when faced with moderate water supply shortages. However, when shortages are projected to become more pronounced, a wide variety of demand reduction strategies emerge. Various approaches must be carefully considered to determine which is best suited for the particular needs and characteristics of the community.

On April 2, 2009 Council member Lightner issued a memo to the Independent Budget Analyst requesting information on the water use reduction programs used by other California water agencies, including:

- Program effectiveness;
- Time and staffing needed for implementation and administration;
- Impact to different customer classes; benefits and drawbacks such as user perception, ease of implementation, and incentive for long-term conservation;
- Special needs for institutions such as schools and hospitals and industries such as biotechnology; and
- The availability and cost effectiveness of new technologies available to help such institutions reduce water consumption.

The IBA has begun researching water use reduction programs used by other agencies, and much of that information has been included in this report. However, the volume and complexity of the information requested in the April 2 memo would likely take a considerable amount of time to compile, and certain elements may be beyond the IBA's ability to ascertain. Based on the results of the April 15 NR&C Committee meeting, and any further direction from the Committee, the IBA will pursue further research and information as needed.

This report begins by providing an overview of the proposed water allocation methodology. Several key elements of the methodology are then discussed in greater detail, including the distinction between indoor and outdoor usage, and how that distinction impacts the overall percentage reduction in water use that may be required. Some of the equity concerns that have been raised in regard to the proposed methodology are then addressed. Finally, the concept of pricing strategies are explored, both as a part of drought response plans and also as a means of incentivizing conservation year-round.

Overview of Proposed Methodology

On March 20, 2009, the Water Department released the proposed methodology for establishing water allocations, as provided for in Drought Response Levels 2 – 4 of the

City's Emergency Water Regulations. Under the proposed methodology, an allocation would be established for each water customer as a percentage reduction from a baseline usage amount. Allocations would be established on a four-month basis, effectively creating three allocation periods over the course of a year. The baseline usage for each four-month period is defined as the average water use in the same four-month period from FY 2005 to FY 2007.

Once baseline usage is established for each customer, reduction factors are applied to determine the allocation. Different reduction factors are applied to indoor and outdoor water use, in recognition that outdoor use is generally more discretionary. As currently proposed, allocations for different customer classes will be calculated using the following reduction factors:

Customer Class	Indoor	Outdoor
Single Family Resident	5%	45%
Multi-Family Resident	5%	45%
Commercial/Industrial	3%	45%
Irrigation Only	N/A	45%

Once allocations are established, customers will have the discretion to use water as they see fit, provided they stay within their allocation.[1] Should customers exceed their allocation between 1-15%, a penalty of $2.42 per hundred cubic feet (HCF) will be assessed on all excess usage. Usage that exceeds allocations by more than 15% will be penalized at a rate of $4.85 per HCF. These penalties are intended to discourage customers from exceeding their allocation, and are applied in proportion to the charges the City may face from the County Water Authority if the City exceeds its allocation. It should be noted that these penalties will be levied in addition to the standard usage rates.

The proposed methodology also includes a process by which customers may request a variance to their allocation. For some customers, it is anticipated that water use in the baseline period will not be reflective of current household or property characteristics. This would be the case, for instance, if there has been in increase in household occupancy. Other circumstances for which a variance may be granted include a significant change in business characteristics, establishment of a new home or facility with no prior usage history, water need for fire prevention or erosion control, or for medical conditions. Commercial and industrial customers may also request a variance due to *process water*, or water that is used in a manufacturing or treatment process, in actual product production, in cooling towers, or for research and development. It should

[1] The distinction between indoor and outdoor water use is only made for the purpose of calculating individual allocations. Certain year-round water waste prohibitions as specified in the Emergency Water Regulations will still apply.

be noted that certain efficient water use and best management practices must be employed before allocation variances will be granted.

Finally, two other central elements of the proposed methodology are the *Supersaver Credit* and the *High-User Adjustment*. The Supersaver Credit essentially establishes a minimum water allocation for any customer, currently proposed at 6 HCF per month[2]. Customers who use an average of 6 HCF or less per month will not be required to make any further reductions; for all other customers, the minimum allocation for any month will be 6 HCF. In contrast, the High-User Adjustment establishes a maximum amount of water that will be considered as indoor use for the purpose of calculating allocations. Under the proposed methodology, indoor use would be capped at 20 HCF per month. This cap would require a larger overall reduction for customers who use more than 20 HCF per month indoors, as any usage over this amount would be subject to the outdoor reduction factor.

Indoor vs. Outdoor Usage

Since allocations are calculated by applying different reduction factors to indoor and outdoor use, one of the key elements of the proposed methodology is in determining the indoor and outdoor usage for each customer. Following the methodology used for the purpose of sewer billing, indoor water use is defined as the lowest metered use over any 60-day period between the months of December and March. This definition relies on the assumption that irrigation is at its minimum levels during the winter months, and therefore the majority of the water used during this period is indoors. It should be noted that indoor use is assumed to be held constant in each month for the purpose of calculating water allocations.

This method of estimating indoor use is common in sewer billing since sewer flows are not usually metered. A Mass Balance Analysis, which compares estimated sewer flows with quantities actually received at the treatment plants, was conducted for the 2006 Wastewater Cost of Service Study. The Analysis showed that the methodology used to estimate sewer flows was quite accurate, reflecting just a 1.8% variance from actual flows received.[3] While there may be some customers who do not reduce their irrigation during winter months, which would result in an overestimation of indoor use, on average we feel that this is a valid methodology for estimating indoor and outdoor water use.

[2] For single family residents (SFR). The Supersaver Credit for multi-family resident customers is 4 HCF per month for each unit.

[3] The Mass Balance Analysis showed that the estimated flows were lower than the actual flows. As a result, the SFR indoor usage cap was revised upward from 14 HCF per month to 20 HCF, consistent with State Water Resources Control Board guidelines.

Overall Water Use Reductions

An important element to consider in evaluating the proposed methodology is how overall water use reductions are applied across the City's customer base. As previously described, allocations for each customer would be established by applying a 5% reduction to baseline indoor usage and a 45% reduction to outdoor use. However, this does not mean that each customer will face the same percentage reduction in terms of overall use. Because a significantly greater reduction factor is applied to outdoor usage in calculating individual allocations, customers who use a larger percentage of their water for outdoor purposes will face a larger reduction, both in absolute terms and as a percentage of total water use.[4] This is illustrated in the example below.

Hypothetical Reductions under Proposed Methodology

Baseline Use (HCF)	Outdoor Use (HCF)	Outdoor as % of Baseline	Total Reduction (HCF)	Reduction as % of Baseline
8	2	25%	1.2	15%
10	3	30%	1.7	17%
14	6	43%	3.1	22%
17	9	53%	4.45	26%
20	10	50%	5	25%
32	22	69%	10.4	33%

According to data from the Water Department on the average monthly consumption by single family resident customers, the top 10% of users account for nearly 25% of total water consumption. Since water use trends are skewed toward higher users, we believe that it would be appropriate for higher users to make a larger percentage reduction in terms of overall use. This would be accomplished under the proposed methodology, provided that the percentage of water used outdoors increases with total water consumption. If this can be demonstrated, we believe that it would be a noteworthy attribute of the proposed methodology, and may alleviate some of the equity concerns that are discussed below. The IBA will continue working with the Water Department to obtain the necessary data to determine whether this is the case.

Equity Concerns

One of the most prevalent criticisms of the proposed methodology is that it benefits wasteful water users and punishes efficient water users. Since water allocations are based on historical usage, customers that used more water in the past will receive a larger allocation than customers who used less. If variances in water use were due only to

[4] This section applies primarily to single family resident customers.

differences in household size and characteristics, then this would not necessarily be a problem. However, to the extent that differences in water use are due to inefficient or wasteful practices, the proposed methodology would seem to be problematic. One can certainly imagine a scenario where two water customers with identical family size, lot size, irrigable area, and landscape characteristics use markedly different amounts of water. In this hypothetical scenario, under the proposed methodology the more wasteful water user would receive a larger allocation.

We believe that this is a legitimate criticism of the proposed methodology. As the Water Department has indicated, it is likely that a more accurate and equitable system would be to base allocations on characteristics that are specific to each customer, such as family size, lot size and irrigable area. In this way, allocations would be based on aggregate water need, and could be scaled up or down depending on individual characteristics. The city of Boulder, Colorado, currently employs this type of allocation methodology. Monthly water budgets in Boulder consist of an indoor allotment equal to 7,000 gallons per month for a family of four (approximately 58 gallons per day, per person), and an outdoor allotment that is based on customer-specific irrigable area and seasonal watering needs[5]. Water budget may be increased if there are more than four people in a household, or for special landscape characteristics. This is similar to the allocation methodology used by the Irvine Ranch Water District.

While individualized water allocations may be considered more accurate and equitable, they present other concerns. Obtaining accurate data on household size through site visits would be time consuming and labor intensive. If measures such as average persons per household are used, customers that fall below the average would receive a disproportionately high allocation. In addition, administration of this type of methodology could be difficult, as an ongoing verification process would be needed to ensure accuracy of customer data, and to prevent manipulation of the system. Finally, this type of methodology requires a billing system that is sophisticated enough to handle such diverse customer information. It is unclear whether the City's current billing system has the capability to manage this type of information.

Despite these concerns, we support the Water Department's stated intent of continuing to evaluate the feasibility of moving toward a more individualized allocation methodology. It should be noted that by January 2010, local agencies will be required by State law to implement a Water Efficient Landscape Ordinance which, among other things, could require establishment of landscape water budgets. The City may have an ideal opportunity to develop an individualized water allocation methodology in coordination with such an Ordinance.

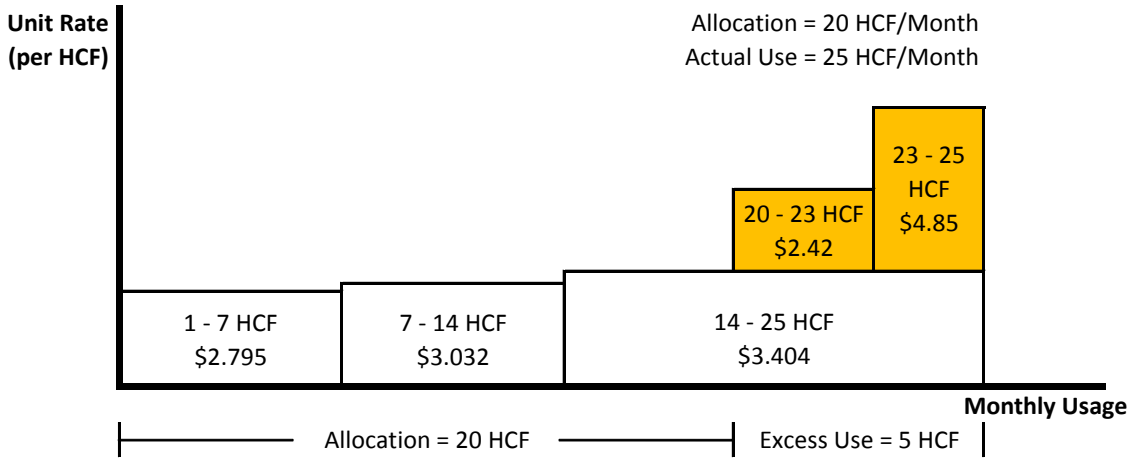
[5] For single family residents. Allocations for multi-family resident and commercial/industrial customers take into account other factors, such as number of dwelling units and historical use.

Pricing Strategies

Increasingly, water agencies are using pricing strategies as part of their drought response programs. One such pricing strategy is in the form of excess use charges, which are used in conjunction with rationing programs, and charged to customers who exceed their allocation. Agencies such as the Contra Costa Water District and the East Bay Municipal Utility District levy excess use charges as a means of incentivizing customers to stay within their allotments.

Under the proposed water allocation methodology, the penalties that would be imposed if customers exceed their allocation are examples of excess use charges. The chart below shows how the penalty rate structure would be applied to a representative single family resident customer.

Hypothetical Rate Structure Under Proposed Methodology



Another pricing strategy that is used in drought response plans is the implementation of drought rates. Drought rates are typically just an expansion of an existing tiered block structure, with steeper price increases imposed between usage blocks. The goal of implementing drought rates is two-fold: to further incentivize conservation and to recover revenue that is lost due to reduced consumption. Drought rates may be set at different levels depending on the demand reduction that is needed. The table below shows the drought rates used by the Otay Water District for various at various drought stages.

Otay Water District Drought Rates

Usage (HCF)	Standard Rates*	Stage 2 Up to 20%	Stage 3 Up to 40%	Stage 4 Over 40%
0 - 5	$1.12	$1.12	$1.12	$1.12
6 - 10	$1.74	$1.74	$1.74	$1.74
11 - 35	$2.26	$2.37	$2.49	$2.60
36 +	$3.48	$4.52	$5.57	$6.61

** Also for Stage 1 - Voluntary 10% reduction*

In addition to using pricing strategies in drought management planning, many water agencies have begun to employ aggressive tiered block pricing structures to incentivize conservation and efficient water use on a year-round basis. Under this type of pricing structure, levels of consumption are aggregated into usage blocks. Typically, the first few units of consumption are priced at a relatively low rate, with inclining per-unit rates charged at subsequent usage blocks. The City of San Diego uses a three-tiered block rate structure for commodity charges to single family residents. While this rate structure is designed to encourage conservation, the rate tiers are relatively passive with respect to higher levels of consumption. The table below shows the City of San Diego's tiered rate structure compared to those used in the cities of Denver and Tucson.

Agency	Tier	Usage (HCF)	Rate	Ratio to Tier 1
San Diego	1	0 - 7	$2.795	1.00
	2	7 - 14	$3.032	1.08
	3	14 +	$3.404	1.22
Denver*	1	0 - 14.7	$1.43	1.00
	2	14.7 - 40.1	$2.86	2.00
	3	40.1 - 53.5	$4.29	3.00
	4	53.5 +	$5.72	4.00
Tucson	1	1 - 15	$1.23	1.00
	2	16 - 30	$4.50	3.66
	3	31 - 45	$6.41	5.21
	4	46 +	$8.94	7.27

** Denver's rates are charged per 1,000 gallons. Usage and rates shown here in HCF equivalent.*

As this table shows, the price tiers in San Diego are much less aggressive than in either Denver or Tucson, with relatively small increases in per-unit rates across usage blocks. It should be noted, however, that Tier 1 usage in both Denver and Tucson provide for greater consumption at a lower rate than in San Diego. The rate structures in these cities are designed to be significantly more punitive on higher water users.

The City of Boulder has a tiered-block pricing structure that is based not on absolute units of consumption, but on consumption relative to a customer's individual water budget. As previously discussed, water budgets in Boulder are based on average household population and irrigable area. Usage blocks are then based on the percentage of a customer's water budget, with rates increasing steeply for usage in excess of the assigned budget. This is shown in the table below.

Tiered Block Water Rates in Denver

Usage Block	% of Water Budget	Per-Unit Rate	Ratio to Base*
1	0 - 60%	$2.06	0.75
2	61 - 100%	$2.75	1.00
3	101 - 150%	$5.50	2.00
4	151 - 200%	$8.25	3.00
5	Over 200%	$13.75	5.00

** Block 2 is defined as the base rate.*

Boulder's rate structure is an example of how water budgets and tiered block rates can be combined to incentivize conservation. It should be noted that Boulder's water budgets are designed to efficiently allocate water on a year-round basis, not for temporary rationing. However, this structure provides the city with flexibility to respond to unexpected water shortages by lowering water budgets, while still allowing customers to determine the way in which they use water.

We believe that moving to a more aggressively tiered block rate structure has the potential to create a powerful incentive for year-round conservation and efficient water use. We recommend that the City evaluate options for implementing such a rate structure during the next cost of service study.

CONCLUSION

The City's emergency water regulations provide for the establishment of water allocations if demand reductions of greater than 10% (Drought Response Levels 2 – 4) are needed to meet projected water supplies. Under the methodology currently proposed, an allocation would be established for each water customer based on a percentage reduction from average historical use.

Arguably the most salient aspect of the proposed methodology is the distinction between indoor and outdoor usage. Recognizing that outdoor uses such as irrigation are generally more discretionary, allocations would be established by applying a 5% reduction factor to indoor usage, and a 45% reduction to outdoor usage. As a result, customers that use more water outdoors will have to make a larger reduction. To the extent that the percentage of water used outdoors increases with total use, the proposed methodology will require larger reductions from customers that use more water, both in absolute terms and as a percentage of total use. We believe that this is a noteworthy aspect of the water allocation methodology.

However, the proposed methodology is not without concern. Because allocations would be based on historical use, customers who are wasteful or inefficient with their water use will receive a larger allocation than customers who are efficient, all else equal. A more accurate and equitable methodology would be to base allocations on characteristics that are specific to each customer, such as family size, lot size and irrigable area. This type of approach is used by agencies such as the City of Boulder, Colorado, and the Irvine Ranch Water District. While this type of approach also presents certain challenges, we support the Water Department's stated intention to continue evaluating the feasibility of moving toward a more individualized allocation methodology. We believe the requirement under State law to implement a Water Efficiency Landscape Ordinance by January 2010 presents an ideal opportunity for the City to develop such a methodology.

Finally, we encourage the City to consider implementing a more aggressively tiered block rate structure during the next cost of service study. While the proposed water allocation methodology includes a price component in the form of penalties or excess use charges, we feel that more aggressive tiers in the City non-drought rate structure would create a stronger incentive for conservation and efficient water use year-round.

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